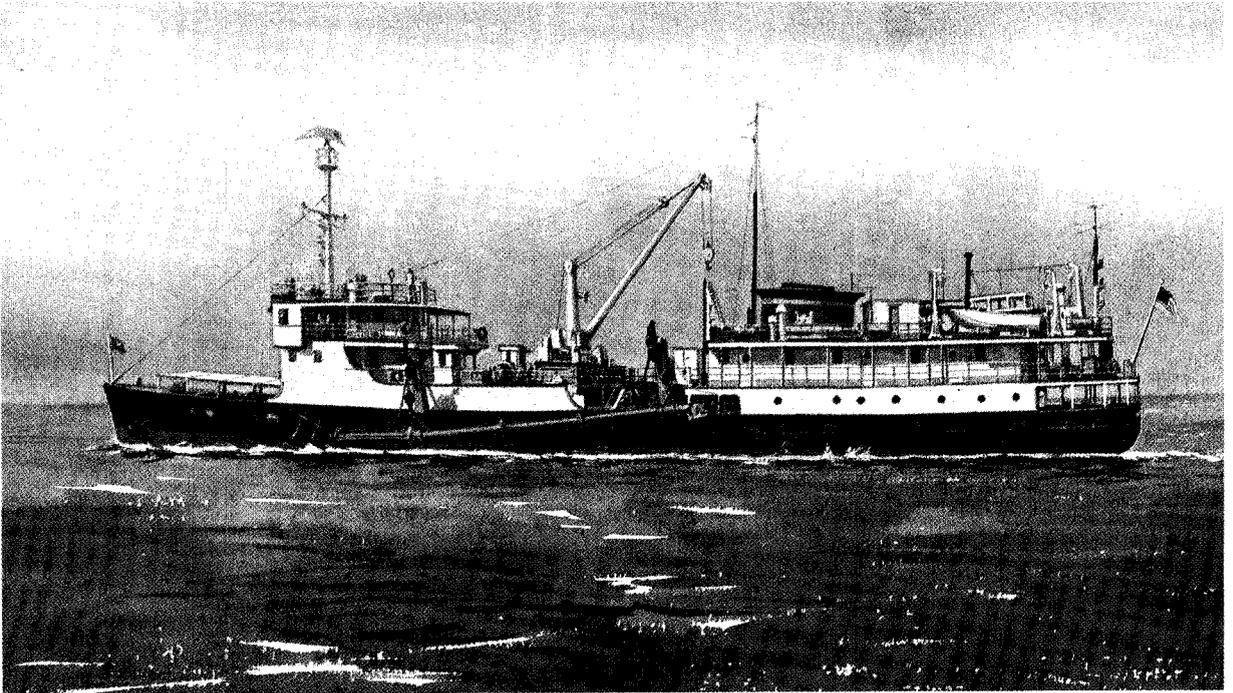


## MARINE DESIGN—UNIQUE MISSION

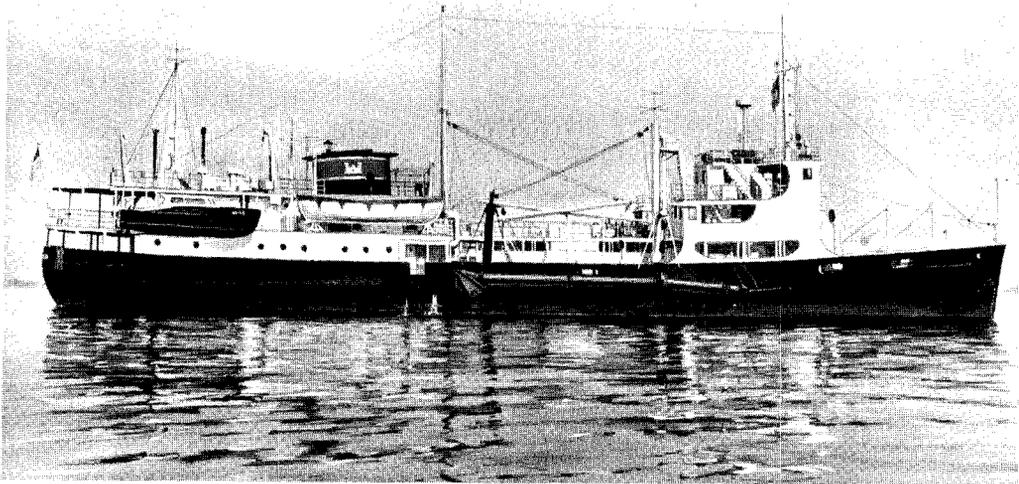
The most likely progenitor of the hopper dredge, general work-horse of the Corps of Engineers, was in all probability the GENERAL MOULTRIE, built in the United States and first operated under Corps of Engineers contract between 1855 and 1857. The MOULTRIE and two subsequent acquisitions, the HENRY BURDEN and the WOODBURY, were converted steamboats fitted with pumps, suction pipes and hoppers. Though small and moderately powered, their successful performance in coastal waters proclaimed the opening of a new field for dredging. A favorably impressed Congress appropriated funds for an additional half-dozen hopper dredges before 1900, intending them primarily for channel maintenance.

Failures of private firms to fulfill urgent channel deepening contracts in New York Harbor and the subsequent dearth of bidders on new contracts produced a situation which demanded intervention by the government itself. Accordingly, in 1902 the government initiated a program of hopper dredge construction, adding 16 vessels to the dredging fleet by 1908. United States hopper dredges were then operating in the coastal waters of the Atlantic and the Pacific, in the Mississippi River Passes and in the Great Lakes.

Recognizing the need for a central design agency to develop the plant and programs of a growing dredging fleet, the Secretary of War in 1908 established a Marine Division in the Office of the Chief of Engineers in Washing-



*Hopper Dredge Hyde*



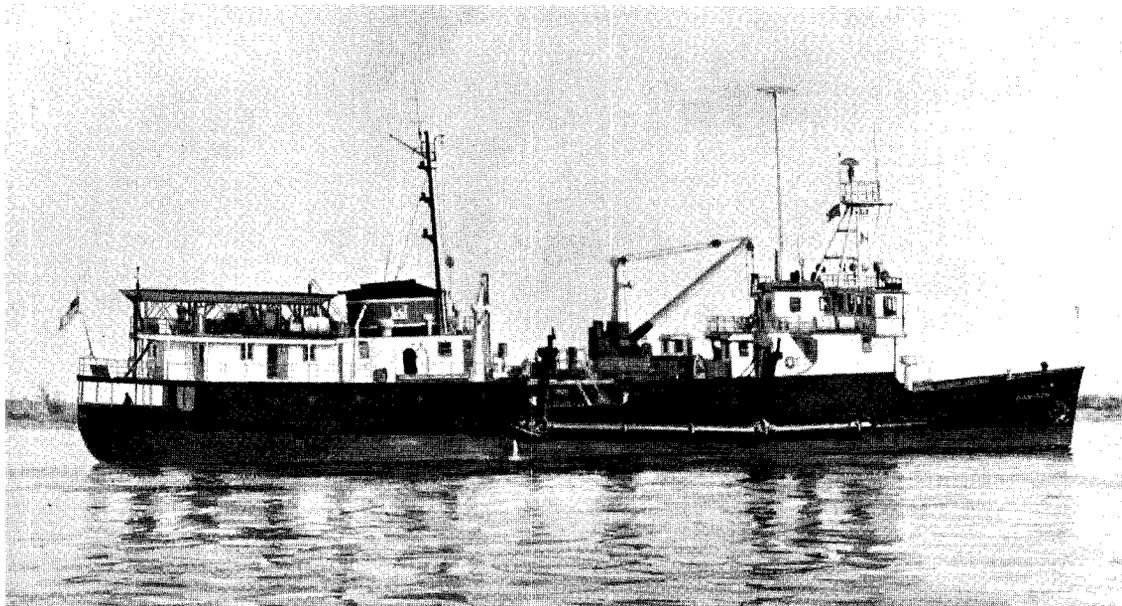
*Hopper Dredge Hains*

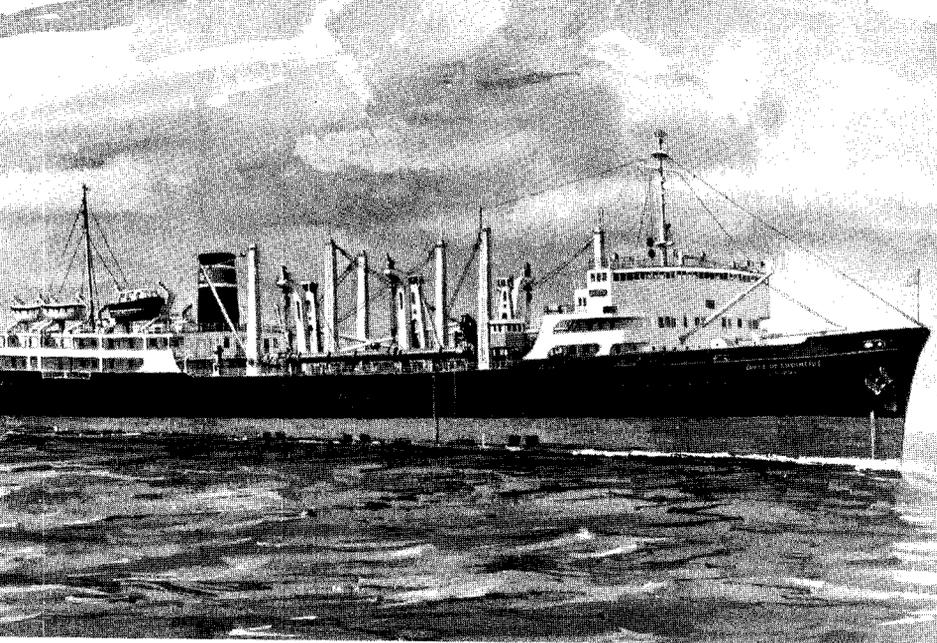
ton, D.C. The new agency was staffed by one ship draftsman and one clerk. The staff increased slowly, reaching strength of thirty by 1933. This design group made significant contributions to the development of dredge pumps and other specialized machinery; the first diesel-electric dredges were designed and built in 1918. The hopper dredge soon developed into a complex specialized plant requiring maintenance and occasional updating and conversion. The kind of liaison necessary for intimate contact with developing technologies and available industrial services were not to be had in Washington.

In 1938, it was deemed expedient to remove the Marine Division to an industrial center where the Corps of Engineers functioned on a District level, thus offering it ready access to industry and to the close staff work of a Contracting Officer. The assignment in 1938 of the Marine Division to the Philadelphia District<sup>1</sup>, was concurrent with the appointment of Major H.B. Vaughan, then Marine Division Chief, to the post of Philadelphia District Engineer.

The relocated group was redesignated Marine Design Division (MDD) and has continued under that name. Hopper dredges

*Hopper Dredge Davison*

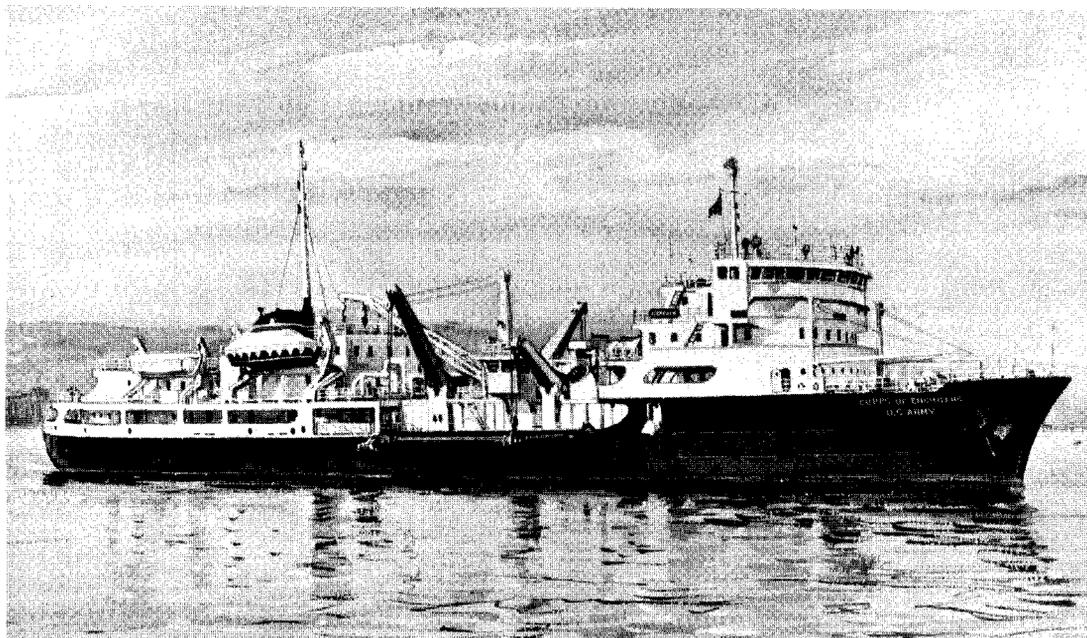




*Hopper Dredge Essayons*

HAINS and HOFFMAN were designed and built by 1942. Between 1945 and 1947 four dredges of the COMBER class came off the drawing boards and were activated. They were COMBER, BIDDLE, GERIG and LANGFITT. The World War II years were filled with a variety of design and construction projects: tugboats, towboats, barges of wood and steel, floating cranes, floating machine shops, port

repair ships and floating power plants. New hopper dredges, too—LYMAN, BARTH, DAVISON and HYDE were turned out, fully outfitted with guns, gun crews, armor and ordnance. Five previously commissioned hopper dredges were equipped with gunnery and armament; they were: ROSSELL, MARSHALL, HARDING, HAINS and HOFFMAN.



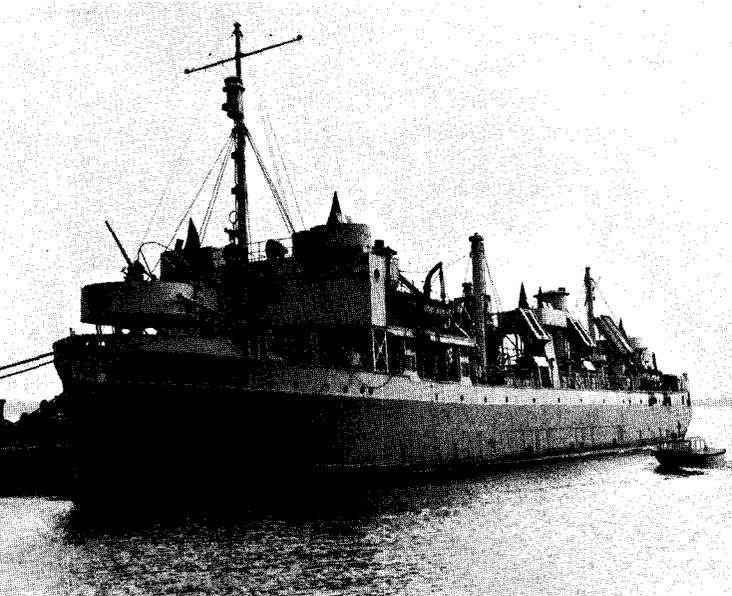
*Hopper Dredge Markham*

Hopper Dredge **ESSAYONS** was delivered in 1950. At 525 feet in length, with a hopper capacity of 8,000 cubic yards and twin dredging pumps of 1,850 horsepower each, **Essayons** was the largest hopper dredge then afloat. This truly ocean-worthy dredge embodied all the features of a refined special tool. Built especially for maintenance of New York Harbor channels, her large payload offset the long disposal run to deep water off Sandy Hook. Sliding trunnions were provided to remove the dragarms from the water and stow them on deck, considerably lessening the resistance otherwise imposed on propulsion of the vessel. The sliding trunnion had previously been used only on hopper dredges **SAN PABLO** and **TAYLOR**. This desirable feature enabled trimmer hulls to reduce drag, increase speed and save fuel; it also facilitated drags and dragarm repairs, as well as docking and operating in congested waters. It received further refinement for its installation on

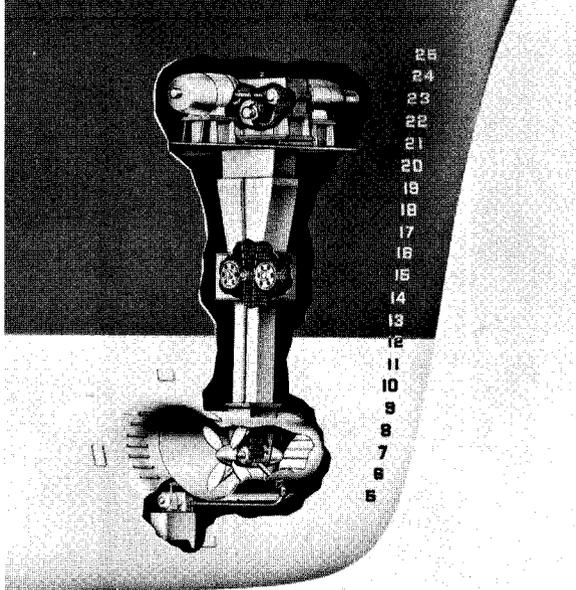
**MARKHAM** (1960) and **MCFARLAND** (1967).

Marine Design Division was active in design and construction projects for the Foreign Aid Program between 1950 and 1957. A dozen hydraulic pipeline dredges were completed and delivered—four to Vietnam and Cambodia; eight to the Phillipines. No new hopper dredges were constructed in this period but three old ones were repowered: **NEW ORLEANS**, built in 1912; **PACIFIC**, built in 1937 and **HARDING**, built in 1939. During this period a new dredging technique was developed for maintenance of the Delaware River channel. The Sump Rehandling Program involved the conversion of three existing hopper dredges. The old **NEW ORLEANS** was decommissioned and converted to a sump rehandler; **GOETHALS** and **COMBER** were modified to pump out topside through a discharge “snorkel.” Carried along concurrently were research and development projects on prefabricated portable piers and breakwaters.

Dredge **MARKHAM** was designed especially for service on the Great Lakes and embodied some innovative features of MDD design. Delivered in 1960, **MARKHAM** was the first U.S.-built vessel equipped with a unique maneuvering device: the enclosed duct-type bow thruster. **MARKHAM'S** retractable sliding trunnions were an improvement over previous systems and its capability for direct pumpout was the first installed on a new dredge. The direct pumpout system was then in the planning stage and would be inaugurated in the Delaware River in 1963, superseding the sump rehandling system and sending into retirement **NEW ORLEANS**, last of the stern-dragarm dredges. Implementation of the new system involved reconversion and repowering of **GOETHALS** and **COMBER** and adaption of two large mooring barges.



*The port repair ship Henry Wright Hurley, equipped with armament.*



*The enclosed duct type bow thruster was installed on Dredge Markham—first United States-built vessel to be so equipped.*

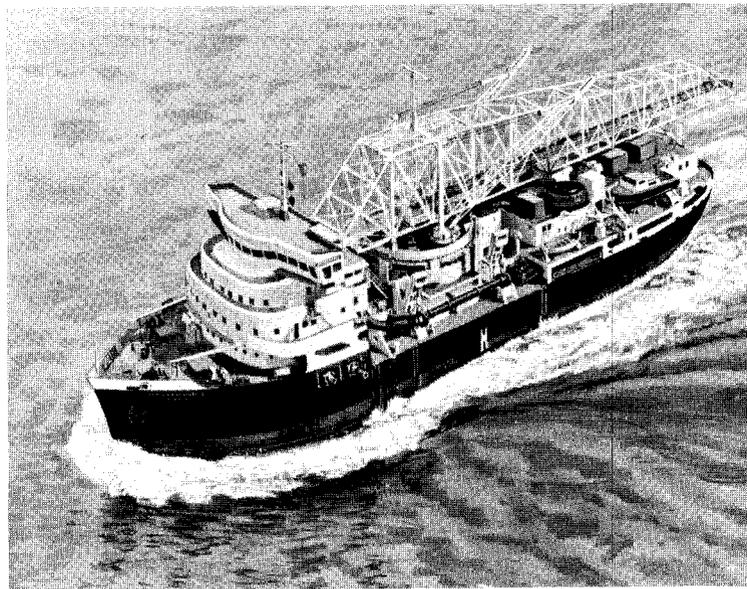
District in 1967, McFARLAND performs all the operations of a conventional hopper dredge, as well as sidecasting and direct pumpout for shore disposal.

The McFARLAND is the most recently constructed of a series of hopper dredges developed for maximum proficiency and versatility. The capability of the current dredging fleet, in terms of volume of material handled, is at least one and one-half times greater than that of the fleet operating in the 1940's. The trend toward reduction in fleet size is due to progressive improvement in the efficiency, performance and speed of each new dredge, necessitating fewer units to carry on the work.

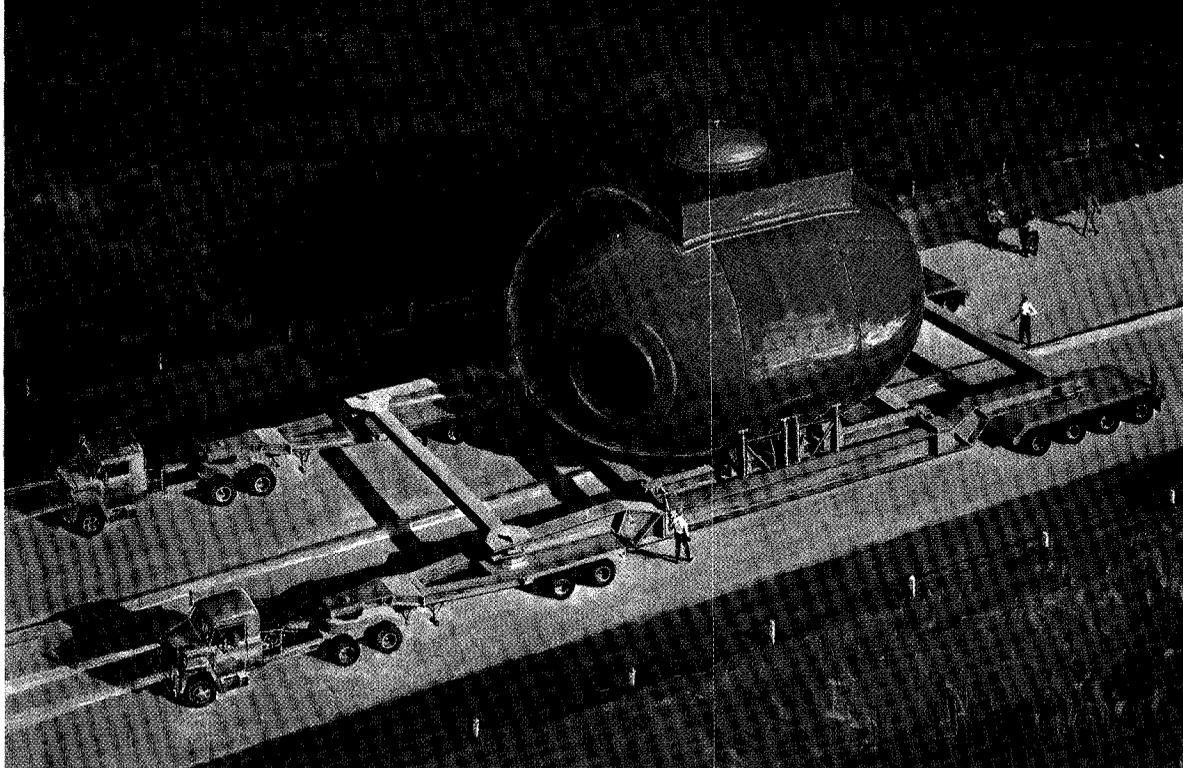
Marine Design Division's annual agenda is guided by a ten-year program established by the Chief of Engineers, to acquire new and

Two unique products of the 1958-67 period were STURGIS (MH-1A) and GRASSE RIVER. The former was a non-propelled floating power plant of 10,000 kilowatt capacity, powered by a pressurized water nuclear reactor. The vessel's hull was a converted Liberty Ship of World War II vintage. The huge steel containment vessel to house the reactor was fabricated in Baton Rouge, La., and transported by a special mammoth rig overland on a five-day trip to the Mississippi River, then transited by water to a shipyard in Mobile, Alabama, for installation in the hull. STURGIS has operated in the Panama Canal Zone since its deployment in July, 1968. GRASSE River is a 350-ton lock gate lifter, designed and constructed for service in the St. Lawrence Seaway.

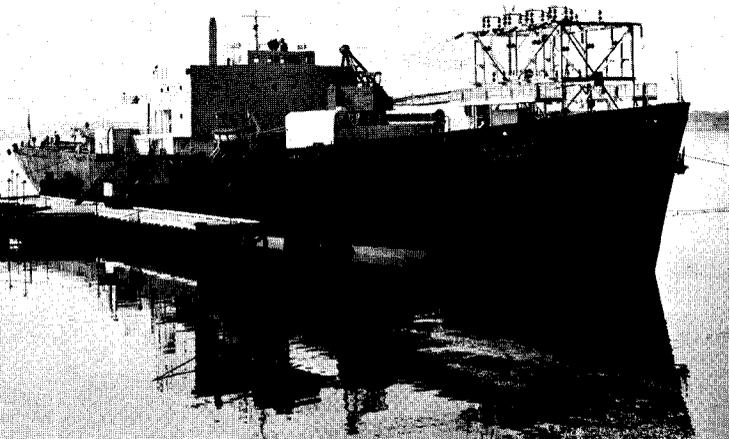
The Dredge HAINS, built in 1942, was later equipped for discharging over jetties by sidecasting dredged material through a long distribution pipe suspended outboard. Though small, with a hopper capacity of only 700 cubic yards, HAINS has demonstrated considerable usefulness as a type. The sidecaster discharge principle, in a substantially expanded version, was combined with all the updated hopper dredging capabilities in the design of the McFARLAND, newest addition to the Corps of Engineers dredging fleet. Completed and delivered to the Galveston



*Hopper Dredge McFarland*



*The containment vessel to house the Sturgis' nuclear reactor is seen in an artist's conception on its five-day transit between Baton Rouge and the Mississippi River.*

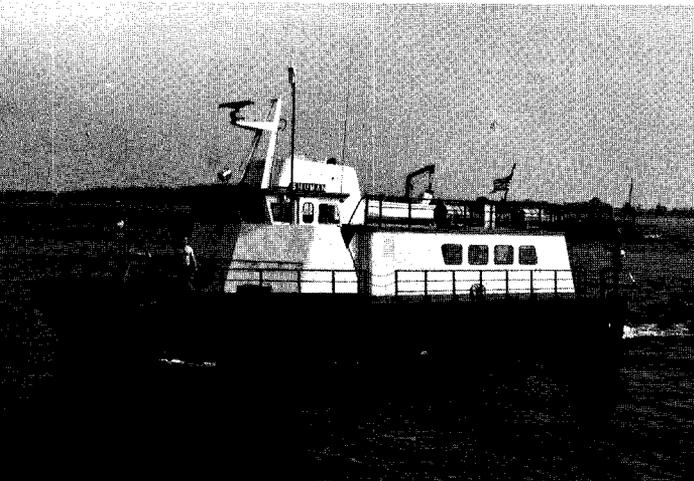


*The Sturgis (MH1A), first floating nuclear power plant.*

rehabilitate old items of floating plant. The Hopper Dredge Board, created by the Chief of Engineers in 1944, meets periodically "to review all plans for any hopper dredge construction and pass on matters of policy and general features of design." The Dredge Board's function was later expanded to include "recommendation" of policies and general design features. Dredge Board members are appointed by the Chief of Engineers and

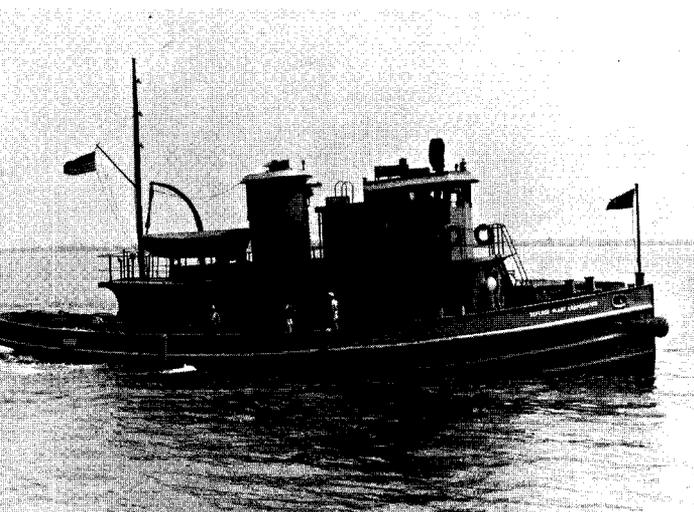
consist of representatives of Divisions in which dredges are based; members are personnel who have direct responsibility for dredging operations in their respective areas.

In addition to hopper dredges, MDD, in fulfilling its design responsibilities must provide a variety of craft, from barges to snag boats and survey boats. Recently delivered to the Mobile District was the new snag boat-tow boat ROS, 170 feet long with a lifting capacity of 60 tons. Survey Boat SHUMAN was commissioned on 11 June 1970 and deployed in the Philadelphia District. This 65 foot aluminum catamaran was named to honor Leigh D. Shuman, former District Engineer and long time Chief of Operations, who gave 41 years of distinguished service to the Philadelphia District. Currently under design is the STE. GENEVIEVE, a pipeline dredge with a 26-inch, long-line disposal capability. It replaces a 40-year old dredge of the same name which operates in the St. Louis District. Work programs for Marine Design Division are generated continually through the annual submissions of Engineer Districts under the Nine Year Plant Replacement and Improvement Programs.



*Survey Boat Shuman*

Looming largely in MDD's future planning is a revised system of Delaware River maintenance and channel improvement. Deep channel dredging, to accommodate new, larger merchant ships will require new plants or modified existing plants; imminent repletion of nearby disposal areas demands a fresh look at the whole problem of dredged spoil disposition. Several plans have been formulated and are subject to further study ("*Dredging the Delaware*," p.p. 183 to 184 ); in the development of new techniques and applicable technology, a valuable rapport is maintained with the District's Operations Division and, through consultations of mutual benefit, with



*A typical unit of the huge tug fleet supplied to Defense Plant Corporation.*

representatives of the dredging industries of the United States and of foreign countries.

In pursuit of its unique mission as central marine design agency for the Corps of Engineers, MDD endeavors to stay abreast of new developments in dredging and marine technology, by participating in research programs at laboratories and universities and by discussions with members of the Dredge Board and other able dredging personnel throughout the Corps and the industry, world-wide.

Through the years the group has remained a compact force of specialists, divided between its two branches, Design and Contract Liaison. The larger Design Branch handles design, plans and specifications of vessels; the smaller group does cost estimates, contract administration and inspection. A number of complete professional careers can be tallied to Marine Design's accomplishments—substantive, consistent accomplishments over the long term. MDD's chiefs have been few and of long tenure; Major Vaughan appointed P.T. Samuel as first chief when the group began its mission in Philadelphia in 1938. W.H. Roberts succeeded to the post in 1948 and the incumbent, G.A. Johnson was made chief in 1958.

A number of marine design features have been pioneered in Philadelphia: the bow thruster and pilot house control of propulsion, both widely adopted in the marine industry. Controllable pitch propellers for dredge use were installed on the HARDING some eleven years ago and MDD was among the first in the field to install sewage treatment equipment on floating plants.